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Housing Production and Determination of Technical Efficiency

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ABSTRACT

In this study, the non-parametric method (DEA) has been used to estimate technical efficiencies of housing construction activities in different states of Iran based on the relevant data collected from provincial statistical centers during the years 2006-2009. The determination of factors affecting efficiency level is important as well as measurement efficiency. According to the results of the data envelopment analysis model, mean efficiencies of housing construction activities of the states were estimated to be 0.944 for Constant Returns to Scale (CRS) assumption. The research founded that only 37% of the states operate technically efficient and most of the technically efficient states had the opportunity to employ illegally migrated workers of neighboring countries in building construction activities using the advantages of lower level of payments and less commitment to the worker's insurance regulations in the country. The study concludes that, appropriate mechanisms should be implemented by the government for stabilizing housing environment within different states, ensuring maximal benefit of state housing expenditures, mobilizing private savings and finally providing subsidy assistance to the inefficient states on a multi-functional basis.

Key words: Factors of production, performance, technical efficiency, Iran

INTRODUCTION

Housing and related infrastructure matters to economic development and can enhance economic performance by creating jobs, generating incomes, reducing poverty and providing the basic needs of life for the households. While having the world's urban population growing by 100,000 households a day, investment in housing and the provision of shelter is potentially the engine of economic growth at national levels, presenting an enormous challenge, above all in developing countries (Tibaijuka, 2009). The bilateral relationship between housing investment and economic growth has long been a popular issue of debate in the literature of economic development and planners almost believe that encouraging housing improvement should not only be considered as a part of economic development strategy but also that massive-scale housing improvement is just a necessary outcome of economic growth. Studies on the role of housing in economic development (Burns and Grebler, 1977; Wells, 1985; Phang, 2001; Leung, 2004; Harris and Arku, 2006). These studies examined topics like employment and income effects, household savings effect, labor productivity effect, health influence and growth effects of housing investment. In short, most of the studies suggest that, housing investment may affect economic development through its impact on employment, savings, total investment and labor productivity (Chen and Aiyong, 2008). It has been well demonstrated by the known hypothesis of Turin (1973) that because of the relationship between construction activity and economic development, housing and related infrastructure can revitalize and sustain economic growth and development, employment creation and poverty reduction. After analyzing data on all significant countries for the period of 1955-1965, Turin concluded that developed countries typically had stronger construction industries which contributed

5-8% to GDP, while in less developed countries, the proportion was around 3-5% of GDP. On the basis of cross sectional data for 87 countries in his further study, Turin (1978) found that the construction industry can play a central role in development strategy of many less-industrialized countries by creating durable and productive employment at a relatively low level of capital intensity.

For developing countries like Bangladesh, housing not only provides physical shelter for people but also has significant impact on the lives of the dwellers in terms of skills enhancement, income generation, increased security, health, self-confidence and human dignity (Rahman, 2007). Housing finance development, therefore, plays a vital role in boosting equitable economic growth and reducing poverty through helping households build assets, improving living conditions, empowering the low and moderate income population in the country. Accordingly, the government of Bangladesh recognizes the importance of the housing sector and has taken steps to address present weaknesses and encourage the development of a more stable and vibrant Housing sector.

In the case of India, apart from a basic necessity of life and shelter, home ownership also serves to fulfil many other fundamental objectives viz., raising the quality of family life in terms of health, education and sanitation. Home also serves as an asset that can be collateralized in times of need, generating a sense of physical and emotional satisfaction and achievement. As a visible output, housing in India is an effective mirror of economic development for creating non-farm activities and generating government taxes and wages that positively influence the quality of life. Thus, the government policies on the housing front have a direct impact on the health of the economy, particularly for the lower and middle income segments of the population whose need is for affordable houses (National Housing Bank of india, 2009). During the last three decades of economic planning, the Government of India has been transforming the housing sector into an engine of economic growth through prudent policies and a host of initiatives including the extension of benefits to mass housing projects, increased rebates for housing loans, increased depreciation for employee housing, lower interest rates, securitization of housing loan, etc. In this regard the Working Group on Urban Housing for the 9th Plan gave a thrust to housing development and targeted construction of 8.87 million housing units.

In the international literature, Ofori and Han (2003) examined the relationship between construction activity and economic development at the provincial level of China during the period 1990-2000 and show that construction industry has acted in both sides, a stimulus of economic growth and a cause of problems in China. Further in the Chinese literature, Zheng (2003) found that domestic housing investment has significant short-run impacts on GDP and a tight relationship between housing investment and GDP does exist. On the other hand the lack of housing access could bring very serious and widespread consequences such as poverty in the county. It has been felt that bringing more schemes and policies makes housing affordable and accessible to the nation, more specifically to the lower income families which generally suffer from discriminatory actions.

Information provided by Haq (2009) showed that housing construction is one of the most labour intensive economic activities in Pakistan, requiring large numbers of workers, creating hundreds of thousands of jobs and when the buyers move in, they will demand all kinds of products and services to furnish their homes, thereby creating further employment opportunities. These activities offer a great recipe for reigniting economic growth and renewed prosperity in Pakistan. Generally speaking, research studies in Pakistan have clearly demonstrated that housing has the potential of becoming an engine of economic growth because of its high yield on invested resources, a high multiplier effect and a host of beneficial forward and backward linkages in the economy.

THE CONTEXT OF IRAN

Iran's economy is a transition economy with a large public sector. It is the sixteenth largest economy in the world by parity and an estimated 50% of the economy is centrally planned. Exports are dominated by oil and gas 80 and constituted 60% of the government revenue in 2010. Economic activities are dominated by industrial sector, which represents about 45% of the country's GDP and includes oil and gas, petrochemicals, steel, textile and automotive manufacturing. The services sector accounts for another 43%. Agriculture continues to be one of the economy's largest employers 11%, representing one-fifth of all jobs (Ilias, 2008). Iran is one of the few major economies that did not suffer directly from the current downturn crisis. High oil prices in recent years have enabled Iran to amass US$ 97 billion in foreign exchange reserves. Although this increased revenue has aided self-sufficiency and domestic investments, double-digit unemployment and inflation remain while the economy has seen only moderate growth (World Bank, 2009). In the wake of the global economic crisis, Iran has found its economy facing pressure from the rapidly declining price of oil, which plummeted to $46 per barrel in early January 2009 from a high price of $147 per barrel in early July 2008 (Qazavi, 2009). Thereby Iran's economic growth dropped to 3.3% between March and September 2008 and the country planned to reduce its dependence on oil export revenues by building up other sectors of its economy just like the housing construction sector. The actual scientific population and housing census has been tallied in the country every ten years since 1956, according to the law under the supervision of Statistical Centre of Iran (SCI). The 2006 census which was conducted all around the country was the third under the Islamic Republic of Iran (Rabiee, 2004). At present Iran's territory consists of 30 provinces, which are governed by a local center, usually the largest local city. Provincial authority is headed by a governor (Ostandar), who is appointed by the Minister of Interior, subject to approval of the cabinet. Regional planning is directed through the budgeting system which is annually proposed by the central government and approved by the parliament (Sepehrdoust, 2009).

Normally construction of housing and commercial buildings is carried out with the participation and collaboration of the owners, people's assistance, support of banks and the free technical and engineering services from the government. The role of the Ministry of Housing and Urban Development and its affiliated Housing Foundation is very important as these are the two major organizations for the approval and implementation of special plans, housing projects and building codes including earthquake mandatory codes. According to the global estimates, Iran is placed in the list of the top ten countries facing disasters among the developing countries and as a disaster-prone country preparation of housing models suitable to various climates, expansion of insurance schemes regarding natural resources and strengthening of buildings is very important for risk reduction and natural disasters.

Annual reports of Iran central bank on housing economy shows that at current prices, investment in housing sector increased more than 75 times during the period 1975-99 and the average share of housing investment in the GDP has been 5.7% within the same period. In the thirty-year period 1971-2000, on average 33% of the total investment in the country was in housing. The average share of the private sector in investment on housing has been 92.5%, thus accounting for the bulk of investment in this sector. According to Zanjani (2006), between 1966 and 1996 there was an annual increase of 3.44% in housing units, whereas the annual increase in the number of households was 3.02%. That means in all three decades the growth rate of housing exceeded the growth rate of households and population. In his empirical study further concludes that the physical and economic criteria of housing in Iran faced great changes during the years of development planning as follows:

- Total number of one-room housing units in urban and rural areas fell 80 percent while the number of three-room and plus housing units rose by 67%
- The number of rooms at the disposal of each household increased significantly due to relatively large traditional structure in Iran
- The number of non-durable housing units with construction material (mud brick and wood, mud bricks with clay and straw plaster, straw huts) fell to one-fourth and the number of durable housing units with construction material (brick and steel, stone and steel and concrete) increased by more than five times. The ratio of these housing units in the rural areas has increased from 1.1 to 28.3% (nearly 26 times)
- The rate of ownership increased rapidly in the urban areas, expressing that owning a house is considered an important status symbol in Iran as elsewhere
- The ratio of households having facilities and amenities such as electricity, water, gas and telephone at their disposal has continuously risen

MATERIALS AND METHODS

Studying production is of great significance in economic theory because of scarce resources and the human desire to fully utilize them. It is simply defined as a process by which inputs are combined, transformed and turned into outputs and is a fundamental concept in economic theory (Case and Fair, 1999). Production function on the other hand can show the maximum output which can be achieved by any firm with any possible combination of inputs (Seiford, 1989). The inputs can normally be generalized as natural resources such as land, human resources and man-made aids to further production (like tools and machinery). Outputs on the other hand, can be categorized into tangible products including goods and intangible products including services. According to Dyson (2001), performance measurement plays an essential role in evaluating productivity and efficiency because it can define not only the current state of the system but also its future in the economy. Productivity and efficiency are the two most important concepts in measuring performance. However, these two different concepts have mistakenly been treated as the same in most of the literature. The productivity of a producer can be loosely defined as the ratio of output(s) to input(s). Efficiency on the other hand can be defined as relative productivity over time or space, or both (Wang *et al*., 2010).The difference between efficiency and productivity can be simply illustrated, as shown in Fig. 1,where the X-axis represents inputs and the Y-axis denotes outputs and Points A, B and C refer to three different producers. The productivity of point A can be measured by the ratio AD/OD. Given the same input, it is quite clear that productivity can be further improved by moving from point A to point B. The new level of productivity is then given by BD/OD. The efficiency of point A, on the other hand, can be measured by the ratio of the productivity of point A to that of point B, i.e.,

$$\frac{AD/OD}{BD/OD}=\frac{AD}{BD}$$

The above efficiency is normally termed technical efficiency in economics and includes output- and input-oriented technical efficiencies, i.e., the producer can either improve output given the same input (output-oriented, point A to B) or reduce the input given the same output

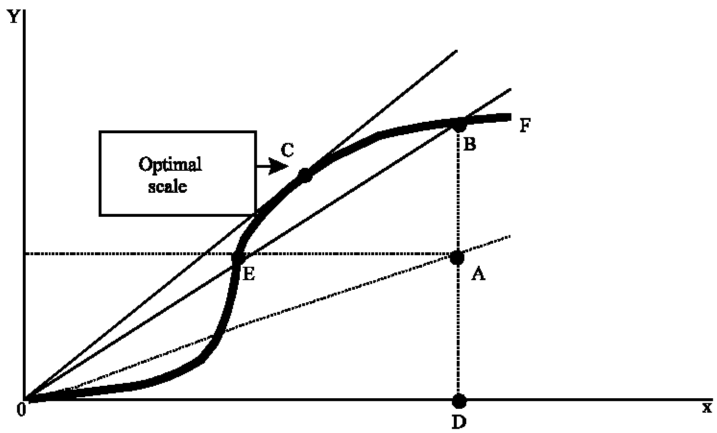

Fig. 1: Illustration of efficiency and productivity

(input-oriented, point A to E) by improving technology. The heavy curve OF is the so-called production frontier. All the points on the production frontier are technically efficient, whilst all the points below or lying to the right of the efficient frontier are technically inefficient. The production frontier reflects the current state of technology in the industry (Coelli *et al*., 1998). Normally, efficiency studies manage to measure Technical Efficiency (TE), Allocative Efficiency (AE) and Economic Efficiency (EE) in the process of Data Envelopment Analysis (Ghorbani *et al*., 2009).

DATA ENVELOPMENT ANALYSIS MODEL

Farrell (1957) introduced a methodology for measuring efficiency nearly five decades ago and his methodology is still undergoing refinement and improvement. There are two approaches to estimating technical efficiency, parametric and non-parametric. The Stochastic Production Frontier (SPF) developed by Aigner *et al*. (1977) and Meeusen and van den Broeck (1977) is a parametric approach which is used for the estimation of production frontiers. For example in their study, Erhabor and Emokaro (2007), employed stochastic frontier production function to analyze the relative technical efficiency of Cassava farmers in Nigeria.On the other hand, Data Envelopment Analysis (DEA) developed by Charnes *et al*. (1978), is a non-parametric approach. It is a Linear Programming methodology to measure the efficiency of multiple Decision Making Units (DMUs) when the production process presents a structure of multiple inputs and outputs (Fig. 2). DEA is used to measure the relative productivity of a DMU by comparing it with other homogeneous units transforming the same group of measurable positive inputs into the same types of measurable positive outputs. Some of the studies are conducted in two steps (Koc *et al*., 2011). In the first step, technical efficiency scores are calculated using an input oriented Data Envelopment Analysis (DEA). In the second step, regression analysis is used to identify determinants of technical efficiency (Alemdar and Oren, 2006).

The input and output data for Fig. 2, can be expressed by matrixes X and Y in Fig. 3, where, x_{ij} refers to the ith input data of DMU_j, whereas y_{ij} is the ith output of DMU_j .In this methodology, efficiency is defined as a weighted sum of outputs to a weighted sum of inputs (Eq. 1), where the weights structure is calculated by means of mathematical programming and Cconstant Returns to Scale (CRS) are assumed (Charnes *et al*., 1978). The CCR model can be expressed by (Eq. 1-4):

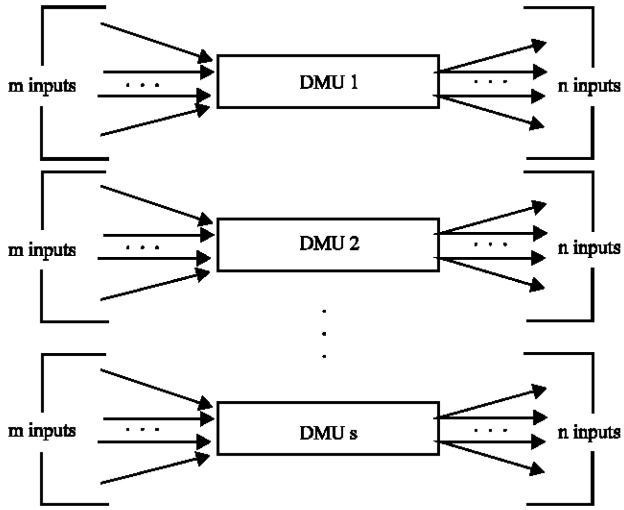

Fig. 2: DMU and homogeneous units

$$X = \begin{pmatrix} x_{11} & x_{12} & \cdots x_{1s} \\ x_{21} & x_{22} & \cdots x_{2s} \\ \vdots & & \\ x_{m1} & x_{m2} & \cdots x_{ms} \end{pmatrix}$$

$$Y = \begin{pmatrix} y_{11} & y_{12} & \cdots y_{1s} \\ y_{21} & y_{22} & \cdots y_{2s} \\ \vdots & & \\ y_{n1} & y_{n2} & \cdots y_{ns} \end{pmatrix}$$

Fig. 3: Matrixes of X (inputs) and Y (outputs)

$$(FP_0)\text{Max} \quad \theta = \frac{u_1 y_{10} + u_1 y_{20} + \cdots + u_n y_{n0}}{v_1 x_{10} + v_2 x_{20} + \cdots + v_m x_{m0}} \tag{1}$$

$$\text{Subject to } \frac{u_1 y_{1j} + u_2 y_{2j} + \cdots + u_n y_{nj}}{v_1 x_{1j} + v_2 x_{2j} + \cdots + v_m x_{mj}} \leq 1 \quad (j = 1, \cdots, s) \tag{2}$$

$$v_1, v_2, \cdots, v_m \geq 0 \tag{3}$$

$$u_1, u_2, \cdots, u_n \geq 0 \tag{4}$$

The CCR model, measures the maximum efficiency of each DMU by solving the Fractional Programming (FP) problem in Eq. 1 where the input weights v_1, v_2, ... v_m and output weights u_1, u_2, ... u_n are variables to be obtained. Symbol o in Eq. 1 varies from 1 to s which means s optimisations for all s DMUs. Constraint 2 reveals that the ratio of 'virtual output' ($u_1y_{10} + u_2y_{20} + \cdots + u_ny_{n0}$) to 'virtual input' ($v_1x_{10} + v_2x_{20} + \cdots + v_mx_{m0}$) cannot exceed than 1 for each DMU, which conforms to the economic assumption that the output cannot be more than the input in production.

The above FP (Eq. 1-4) is equivalent to the following Linear Programming (LP) formulation given in Eq. 5-9. That is necessary to note that transforming the FP model into the LP model has been of great significance for the rapid computation and wide application of DEA.

$$(LP_0)\text{Max}\quad \theta = u_1y_{10} + u_2y_{20} + \cdots + u_ny_{n0} \tag{5}$$

$$\text{Subject to}\quad v_1x_{10} + v_2x_{20} + \cdots + v_mx_{m0} = 1 \tag{6}$$

$$u_1y_{1j} + u_2y_{2j} + \cdots + u_ny_{nj} - v_1x_{1j} - v_2x_{2j} - \cdots - v_mx_{mj} \leq 0 \quad (j=1,\cdots,s) \tag{7}$$

$$v_1, v_2, \cdots, v_m \geq 0 \tag{8}$$

$$u_1, u_2, \cdots, u_n \geq 0 \tag{9}$$

To calculate the magnitude of technical efficiency of each individual state in Iran, the DEA technique is useful in resolving the measurement because the calculations are non-parametric, can handle more than one output and do not require an explicit determination of relationships between output and inputs, as is required for conventional estimation of efficiency using production functions. In addition further in-depth analysis of DEA is made to find out important factors responsible for inefficient states in achieving maximum output with possible combination of inputs and thereby identifying the areas of weak performance. The research applies Data Envelopment Analysis (DEA) to evaluate the overall efficiency of housing sector production in 30 states of Iran during 2006-2009, taking each state as a DMU in the model.

Relevant data for the study were obtained from the six month national reports, published by the ministry of housing and urban planning, Iran Statistical Center and Central Bank of Iran for the period 2006-2009.

According to Keeney and Raiffa (1993) and in order to present a unique structure of multiple inputs and outputs, they believe that a desirable set of measurement factors should be complete, decomposable, operational, no redundant and minimal. An assumption underlying DEA is that all the data are known exactly but in reality many factors cannot be measured in a precise manner because the observed values are indefinite. Imprecise data can be probabilistic, interval, ordinal, qualitative or fuzzy. Rayeni and Saljooghi (2010) study proposed a new method for improving the efficiency classifications of DMUs with interval data in using Data Envelopment Analysis models. In this model the inputs and outputs data are located within the bounded intervals.

Since input factors should be mutually exclusive such as Labor, Land, Material, Capital and man-made aids to further production, three important inputs are selected for present study as follows:

- Input 1-Total area of lands under building construction (scale: 1000 sq. m)
- Input 2-Total private investment on building construction (scale: 1000000 Rials)
- Input 3-Total expenditures of building construction (scale: 1000000 Rials)

On the other hand, since outputs can be categorized into tangible products including goods and intangible products including services, therefore three important outputs are selected as follows:

- Output 1-Total Number of Buildings Constructed (units)
- Output 2- Total Area of Flats Constructed (scale: 1000 sq. m)
- Output 3- Total Land Value of Buildings after Construction (scale: 1000000 Rials)

In this study the idea behind applying output oriented DEA technique based on Constant Returns to Scale assumptions (CRS) is that, because of scarce availability of resources and the government service providers desire to fully utilize them, if any state as an individual DMU could use the given range of physical inputs in a technically efficient manner and increase the quantities of outputs at best practice, that state is said to be 100% technically efficient. According to Golany and Roll (1989), the number of DMUs should be at least twice that of the total number of input and output factors considered when applying the DEA model. In this study the number of DMUs is 30, i.e., more than twice of the selected six factors. Therefore, in this study, the proposed DEA model has high construct validity.

In order to distinguish efficient states in further analysis of the study it is suggested to identify the number of times that an efficient state is being referenced by other relatively inefficient states and when it acts as a peer. In addition an alternative way to discriminate efficient states is to identify the slacks which explore the ways a weak efficient state needs to readjust its weakest areas of performance towards achieving a fully efficient status. This is because the process of efficiency measurement based on DEA technique involves relative measurement in which the efficiency score of each state is computed relative to the best performing other states of the country. One of the main findings of the paper could be classifying inefficient states into low, medium and high levels of inefficiency.

RESULTS

After specifying and collection of data regarding input and output factors for the period 2006-2009, statistical description has been presented with valuable information about inputs (total area of lands under building construction, total private investment on building construction, total expenditures of building construction) and outputs (total number of buildings constructed, total area of flats constructed and total land value of buildings after construction) in Table 1. For the validation of the set of variables in DEA model that we selected to measure the state efficiency in housing production, one way is to run a test of reliability on the efficiency scores and compare them for two or more consecutive years using the same variables and methods (Parkin and Hollingsworth, 1997). Another way is to examine the assumptions of the isotonicity relationships between the input and output factors: i.e., an increase in any input should not result in a decrease in any output. Following Golany and Roll (1989), regression analysis on the selected input and output factors is a useful procedure to examine the isotonicity relationships between the input and output factors. If the correlation of the selected input and output factors is positive, these factors are isotonically related and can be included in the model. Therefore the factor that has a weak

Table 1: Descriptive statistics of the variables

Variables	Mean	SD	Minimum	Maximum
Input 1	8142475	1451597	1132499	81174854
Input 2	3114	2683	467	11575
Input 3	3695450	2326107	2313331	130809299
Output 1	5022	6949	717	38393
Output 2	15309480	3690437	1574218	205728415
Output 3	12412	11009	1844	47152

Table 2: Regression analysis of the variables

Variable	Output 1	Output 2	Output 3
Input 1	0.992	0.993	0.795
Input 2	0.846	0.738	0.923
Input 3	0.788	0.993	0.788

Regression equation	S	R^2	R^2 (adj)	F	p-value
$(O_1) = 245 + 0.000319(I_1) + 0.453\ (I_2) + 0.000056(I_3)$	509.965	99.5%	99.5%	1786.30	0.000
$(O_2) = -2772952 + 1.41(I_1) + 1568\ (I_2) + 0.837(I_3)$	3511969	99.2%	99.1%	1058.74	0.000
$(O_3) = 2708 + 0.00376(I_1) + 3.25\ (I_2) - 0.00227(I_3)$	3767.34	89.5%	88.3%	73.89	0.000

isotonicity relation to the other factors should be reexamined. Alternatively, a strong correlation may indicate that the information contained in one factor is already represented redundantly by other factors (Liu, 2005). For the validation of the model, regression analysis on the selected input and output factors is applied to investigate strong and positive relationships between the factors. The significant p-values less than $\alpha = 0.05$ strongly proves that an increase in any input definitely results in an increase in any output (Table 2).

Further analytical study with the help of DEAP computer program (Coelli, 1996); DEA methodology has been applied to measure the overall efficiency of state housing construction undertakings in Iran. That's why the CCR model with constant returns to scale has been applied to evaluate the overall efficiency in each state and also BCC model is used to decompose the total efficiency into the technical and scale efficiency. In their study (Banker *et al*., 1984) developed the model BCC assuming Variable Returns to Scale (VRS). Indeed the scale efficiency score of a DMU is the ratio of the overall efficiency to the technical efficiency.

The overall efficiencies of 30 states are presented in Table 3. The average efficiency score obtained by all states is 0.94 and only eleven states including East Azarbaijan, West Azarbaijan, Tehran, Razavi Khorasan, Semnan, Sistan and Baluchistan, Qazvin, Kermanshah, Lorestan, Hormozgan and Yazd are overall efficient, i.e., only 37% of the states operate technically efficient. The interesting point is that among the overall efficient states there are developed states like Tehran, Semnan, Razavi Khorasan, Yazd, Qazvin and also economically deprived areas such as West Azarbaijan, Sistan and Baluchistan, Lorestan, Kermanshah and Hormozgan. On the other hand it is found that about 63% of the states are relatively inefficient out of which the states Qom, Ilam, and Kerman obtained the lowest efficiency scores (i.e., 0.839, 0.773, 0.751) and states Zanjan, Ardabil, and Kurdistan achieved the highest efficiency scores (i.e., 0.999, 0.995, 0.987).

On the basis of microeconomic production theory a DMU that is overall inefficient could be either technical inefficient or scale inefficient. The overall efficiency calculated from the CCR model has been decomposed into the technical efficiency measured by BCC model and the scale efficiency. The overall efficiency of a DMU is equal to its technical efficiency if and only if that DMU is

Table 3: Operating efficiency of state housing construction

States (DMUs)	Overall efficiency	Technical efficiency	Scale efficiency	Returns to scale	Peer group frequenciest
East Azarbaijan	1	0.981	1	IRTS	10
West Azarbaijan	1	1	1	CRTS	14
Ardabil	0.995	0.997	0.998	DRTS	0
Esfahan	0.959	0.985	0.974	DRTS	0
Ilam	0.773	0.773	1	DRTS	0
Bushehr	0.965	0.965	1	DRTS	0
Tehran	1	1	1	CRTS	9
Charmahal and Bakhtry	0.943	0.951	0.992	DRTS	0
South Khorasan	0.92	0.927	0.992	DRTS	0
Razavi Khorasan	1	1	1	CRTS	6
North Khorasan	0.971	0.971	1	DRTS	0
Khuzestan	0.895	0.994	0.9	DRTS	0
Zanjan	0.999	1	0.999	CRTS	0
Semnan	1	0.999	1	CRTS	15
Sistan and Baluchistan	1	1	1	CRTS	4
Fars	0.859	0.895	0.96	IRTS	0
Qazvin	1	1	1	CRTS	10
Qom	0.839	0.973	0.862	DRTS	0
Kurdistan	0.987	1	0.987	DRTS	0
Kerman	0.751	0.91	0.825	DRTS	0
Kermanshah	1	0.96	1	DRTS	3
Kokiluye and Bu.Ahmad	0.983	1	0.983	DRTS	0
Golestan	0.927	0.991	0.935	DRTS	0
Gilan	0.942	0.956	0.985	DRTS	0
Lorestan	1	1	1	CRTS	6
Mazandaran	0.881	0.961	0.917	DRTS	0
Markazi	0.859	0.966	0.889	DRTS	0
Hormozgan	1	1	1	CRTS	1
Hamedan	0.875	0.974	0.898	DRTS	0
Yazd	1	1	1	IRTS	4
Average	0.944	0.971	0.969		

operating at the most productive scale size, and thus, its scale efficiency is 1. Alternatively if the scale efficiency is less than 1, the DMU will be operating either at Decreasing Returns To Scale (DRTS) or Increasing Returns To Scale (IRTS). This implies that resources may be transferred from DMUs operating at decreasing returns to scale to those operating at increasing returns to scale in order to increase the overall average productivity at both sets of DMUs. The fact behind this reason may be that these inefficient DMUs, due to their relatively poor quality inputs or mismanagement, do not possess economies of scale, or possibly, have been unable to compete with other efficient DMUs (Boussofiane *et al.*, 1991). As a result the inefficient DMUs with positive slacks are considered to be operating at decreasing returns to scale which need to cut their inputs and inefficient DMUs with negative slacks are considered to be operating at increasing returns to scale which need to increase their inputs in order to achieve maximum outputs.

To discriminate efficient States for Housing Construction Undertakings in more depth, some studies have suggested that it is worth identifying the number of times that an efficient States acts as a peer (Hlingsworth and Parkin, 1995). Peer states are those active states with higher referenced frequencies which can be regarded as better performing units due to their outstanding operating environment.

CONCLUSION

The provision of housing and construction services is a key component of the development program in developing economies and Iran is no exception. During the past three decades of economic planning housing has been viewed by the people as an important property investment asset in Iran. This means that housing acquisition in is not only motivated by consumption purposes but also by investment purposes. For them housing is an effective property investment vehicle as it delivers the lowest risk-to-reward ratio when compared with traditional investment alternatives such as stocks, foreign currency and gold coin. Moreover, housing returns exceed the rate of inflation and also there is a positive and significant relationship between housing returns and the rate of inflation (Masron and Fereidouni, 2010).

During the fourth Five-Year Development Plan (2005-2010), the government presented programs such as the Urban Upgrading and Housing Reform Project (UUHRP) which focused on attracting private sector investment and approving legal and economic measures that could result in the construction and availability of affordable housing units. The overall purpose of the proposed Project (UUHRP) is to facilitate the transition to a market-led housing sector in Iran, while improving current living conditions for low and moderate income households. To achieve the above goal, a three phase Adaptable Program Loan was prepared and is spread over a period of twelve years: (i) urban upgrading and community enabling programs in selected cities; (ii) technical assistance for housing sector reforms; and (iii) technical assistance and capacity building for project implementation.

In the current downturn with respect to declining oil prices and global economic sanctions imposed on Iran, the government's housing growth plans can present an opportunity for ensuring new homes are delivered of the right type, in the right place and linked to wider economic outcomes of the nation.

In this study Data Envelopment Analysis (DEA) proved to be a powerful non-parametric technique for comparison of different States (DMUs) and provide a summary measure of relative performance for each Unit. Two DEA models (CCR model and BCC model) were used to evaluate the overall efficiency and further decomposed into technical and scale efficiency of each state.

Based on the results, the research found that only 33% of the states operate as technically efficient and the average efficiency score obtained by all states is 0.944. Some of the technically efficient states have the opportunity to deploy migrated building workers in construction activities with lower level of wages and less commitments to the law and regulations in the country. Rapid urbanization and migration of refugees into the country have made housing one of the country's most acute social problems. It is worth mentioning that due to its political, social and economic stability, Iran has been the largest refugee host Country in the region for more than a decade and thus regularly deals with complex human emergencies. In the field of housing and commercial buildings, the bill of compulsory insurance for the housing sector workers has induced many building constructors to prefer illegal cheap workers mostly migrating from Afghanistan rather than employing home workers, resulting in a wide spread of unemloyment in the country.

On the other hand 63% of the states are found to be relatively inefficient which mostly present decreasing returns to scale. Therefore it is recommended that the states like Qom, Ilam and Kerman, which posses the lowest level of efficiency scores; need to reorganize their structure of inputs in order to get optimum level of outputs. Taking appropriate policy making steps by the central government towards balanced housing production within the efficient as well as inefficient states is going to become more important than ever before because of the increasingly integrated national economy and the significant contribution that housing construction makes to this process.

Overall, present results strongly suggest that the housing sector in Iran needs to aim at mobilizing the combined resources of communities through stabilizing the housing environment, ensuring maximal benefit of state housing expenditure, facilitating technical and logistical housing support mechanisms to enable communities to improve their housing circumstances, mobilizing private savings and housing credit at scale with adequate protection for consumers, providing subsidy assistance to disadvantaged individuals to assist household's affordability and finally coordinating and integrating public and private sector investment on a multi-functional basis. In addition, Iran's geographical position over a seismic belt necessitates the reinforcement and renovation of housing through a boom in real-estate development as well.

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